

I CLAIM:

1. A method of providing first RF signals within a first frequency band from a first location to a multiplicity of second locations, providing bidirectional telephony signals between said first location and at least two of said multiplicity of said second locations, and providing second RF signals within a second frequency band from said at least two second locations to said first location on at least two separate optical paths and comprising the steps of:

transmitting light at a first wavelength modulated by said first RF signals from said first location to at least two intermediate locations via said at least two separate optical paths and from each of said at least two intermediate locations to said multiplicity of second locations on a multiplicity of first paths, each having at least two electrical conductors;

bidirectionally transmitting light at a second wavelength for carrying telephony signals both upstream and downstream on said at least two optical paths between said first location and said at least two intermediate locations and from said at least two intermediate locations to said second locations on a multiplicity of second paths having at least two electrical conductors;

transmitting first and second RF signals at selected frequencies within a second frequency band from at least two of said multiplicity of second locations one each to said at least two intermediate locations on at least two of said multiplicity of first paths;

further modulating said transmitted light having said second wavelength traveling from said at least two intermediate locations to said first location on said at least two optical paths with said first and second RF signals from said at least two second locations; and

25 receiving said first and second RF signals within said second frequency band at said first location.

2. The method of claim 1 and further comprising the steps of:

receiving said light having said second wavelength at said first location traveling from a first one of said at least two intermediate locations on a first one of said at least two optical paths;

5 receiving said light having said second wavelength at said first location traveling from a second one of said at least two intermediate locations on a second one of said at least two optical paths;

recovering and attenuating first telephony signals received from light carried by said first one of said at least two optical paths by a first amount such that
10 said first telephony signals are substantially at a preset value;

recovering and attenuating second telephony signals received from light carried by said second one of said at least two optical paths by a second amount such that said second telephony signals are also substantially at said preset value; and

recovering and attenuating said second RF signals traveling to said first
15 location on said first one and said second one of said at least two optical paths by said first and second amounts respectively such that each of said attenuated second RF signals have substantially the same signal strength.

3. The method of claim 2 and further comprising the steps of:

comparing the strength of recovered second RF signals within said second RF frequency band to a preset threshold; and

inhibiting further transmission of said RF signals within said second
5 RF frequency band if said compared signals are not equal to or greater than said preset threshold.

4. The method of claim 3 wherein said step of recovering said second RF signals from said light waves comprises the steps of receiving light traveling upstream and having said second wavelengths from said at least two optical paths by a photo diode having an anode and a cathode;

5 recovering said second RF signals at one of said anode and cathode of said photo diode; and

recovering telephony signals at the other one of said anode and cathode of said photo diode.

5. A method of providing first RF signals within a first frequency band from a first location to a multiplicity of second locations, providing bidirectional telephony signals between said first location and at least one of said multiplicity of second locations, and providing second RF signals within a second frequency band from said at least one second location to said first location all along a single optical path extending at least partially between said first location and said multiplicity of second locations and comprising the steps of:

10 transmitting light at a first wavelength carrying said first RF signals having a first frequency band from said first location to at least one of said multiplicity of second locations at least partially on said single optical path;

bidirectionally transmitting light at a second wavelength for carrying both upstream and downstream telephony signals on said single optical path extending at least partially between said first location and said at least one of said multiplicity of second locations;

15 further modulating said transmitted light of said second wavelength traveling from said one of said second locations to said first location with second RF signals within a second RF frequency band;

receiving said second RF signals at said first location;
comparing the signal strength of received RF signals within said
20 second RF frequency band to a preset threshold; and
inhibiting further transmission of said RF signals within said second
RF frequency band if said signals are not equal to or greater than said preset
threshold.

6. In a communication system providing signals from a source to a
multiplicity of users, a method of providing a return signal to said source from at
least one of said multiplicity of users comprising the steps of:

transmitting light at a first wavelength of light modulated by RF
5 signals within a first frequency band on a single optical path extending at least part
of the way between said source to said multiplicity of users;

transmitting light at a second wavelength and modulated by
bidirectional telephony signals within a second frequency band on said single optical
path;

10 modulating said transmitted light at said second wavelength by second
RF signals within a second RF frequency band traveling from said second location
to said source;

receiving said second RF signals;
comparing the signal strength of received RF signals within said
15 second RF frequency band to a preset threshold; and

inhibiting further transmission of said RF signals within said second
RF frequency band if said RF signals are not equal to or greater than said preset
threshold.

7. The method of claim 6 and further comprising the step of extracting said telephony signals at one of the anode or cathode of a photo diode, and said second RF signals at the other one of said anode or cathode of said diode.

8. The method of claim 6 wherein said RF signals within said first frequency band have a frequency of between about 50 and 870 MHz.

9. The method of claim 8 wherein said RF signals within a second frequency band have a frequency of between about 5 and 50 MHz.

10. Communication apparatus comprising:

a source for generating first RF signals at a first frequency band and adapted for distribution to a multiplicity of users;

5 a transmission path between a first location having said source and at least one of said multiplicity of users at a second location, at least a portion of said transmission path being optical;

a first light generator for generating light at a first wavelength of light, said light being modulated to carry said first RF signals within said first frequency band on said optical portion of said transmission path;

10 a pair of second light generators one each of said pair located at each end of the optical portion of said transmission path and each for generating light at a second wavelength modulated to carry bidirectional telephony signals traveling between said first and second locations on said optical portion of said transmission path;

15 a second RF signal within a second frequency band generated at the location of said at least one of said multiplicity of users and carried at least partially

to said source of said first location by said optical portion of said transmission path by light having said second wavelength;

20 a first photo detector for extracting said second RF signals from light at said second wavelength;

a comparator circuitry for comparing the signal strength of said extracted RF signals to a preset threshold and then generating a control signal to inhibit further transmission of said extracted RF signals if said signals are not equal to or greater than said preset threshold.

11. Communication apparatus comprising:

a source for generating first RF signals at a first frequency band and adapted for distribution to a multiplicity of users;

5 at least two transmission paths between a first location having said source and at least two of said multiplicity of users at at least two second locations, at least a portion of each of said at least two transmission paths being optical;

a first light generator for generating light at a first wavelength of light, said light being modulated to carry said first RF signals within said first frequency and on said optical portions of said transmission path;

10 at least two pairs of second light generators one each of each pair located at an end of said optical portions of said at least two transmission paths and each second light generators for generating light at a second wavelength modulated to carry bidirectional telephony signals traveling between said first and said at least two second locations on said optical portions of said at least two transmission paths;

15 second and third RF signals within a second frequency band generated at the two second locations and carried to said source one each on said at least two transmission paths by modulating said light having said second wavelength;

an attenuator for attenuating first telephony signals recovered from the optical portion of a first one of said at least two transmission paths by a first amount
 20 such that said first telephony signals are at a preset value;

an attenuator for attenuating second telephony signals recovered from the optical portion of a second one of said at least two transmission paths by a second amount such that said second telephony signals are at said preset value; and

25 attenuators for attenuating said second and third RF signals recovered from the optical portions of said first and second transmission paths respectively such that each of said attenuated second and third RF signals have substantially the same signal strength.

12. The communication apparatus of claim 11 wherein at least one of said photo detectors is a photo diode having a cathode and an anode, and wherein said second RF signals are recovered at one of said anode and cathode and said telephony signals are recovered at the other one of said anode and cathode.

13. The communication apparatus of claim 11 wherein said RF signals within said first frequency band have a frequency of between about 50 and 870 MHz.

14. The communication apparatus of claim 13 wherein said second and third RF signals within said second frequency band have a frequency of between about 5 and 50 MHz.

15. The method of claim 1 and further comprising the steps of:
 amplifying at least one of said first and second RF signals within said second frequency band;

5 amplifying the telephony signals traveling upstream, and amplification
of said RF signals and said telephony signals occurring prior to said signals
modulating said second wavelength of light

monitoring the signal strength of said amplified upstream telephony
signals as a proportion of the modulated light having said second wavelength and
generating a control signal therefrom; and
10 adjusting the amplitude level of said RF signals and said upstream
telephony signals in response to said generated signal.

16. Communication apparatus comprising:

a source for generating first RF signals at a first frequency band and
adapted for distribution to a multiplicity of users;

5 at least two transmission paths between a first location having said
source and at least two of said multiplicity of users at at least two second locations,
at least a portion of each of said at least two transmission paths being optical;

a first light generator for generating light at a first wavelength of light,
said light being modulated to carry said first RF signals within said first frequency and
on said optical portions of said transmission path;

10 at least two pairs of second light generators one each of each pair
located at an end of said optical portions of said at least two transmission paths and
each second light generators for generating light at a second wavelength modulated
to carry bidirectional telephony signals traveling between said first and said at least
two second locations on said optical portions of said at least two transmission paths;

15 second and third RF signals within a second frequency band generated
at the two second locations and carried to said source one each on said at least two
transmission paths by modulating said light having said second wavelength;

a first amplifier to amplify the upstream telephony signals and a second amplifier to amplify the RF return signals, said first and second amplifier providing
20 electrical signals to modulate light at said second wavelength traveling upstream;

a photo diode located at said at least one of said at least two second locations for monitoring the corresponding one of said pair of second light generators;

circuitry connected to said photo diode to provide a control signal representative of the upstream telephony signal strength as a proportion of the output
25 power of said one of said pair of second light generators; and

said control signal connected to said first and second amplifiers for controlling the output signal strength of said first and second amplifier as a selected proportion of said light output at said second wavelength.